

Faidherbia albida: Direct seeding experiments in an arid environment

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Summary:

In 1990, a field experiment was carried out to find out how best to establish a healthy population of *Faidherbia albida* by direct sowing, without the use of plant nurseries, irrigation or inorganic fertilisers. Five different seed treatments including 'No treatment' and two sowing depths were tested. Best results were obtained if the seeds were physically scarified as compared with the hot water treatment and 'No treatment'. 26% (95/360) seeds germinated if nicked and sown at 15mm sowing depth, and about 18% (~66/360) seeds germinated if treated by cutting or abrasion, also at 15mm sowing depth. Poorer results were obtained if seeds were sown at 10mm sowing depth. The total rainfall was 172mm with a one month drought period, one week after sowing. Almost all the seedlings which survived until the end of September still had green leaves at the end of December. Based on the experiences of 1989, many of the seedlings which survived until the end of the year are expected to survive until the next rainy season.

Introduction:

Faidherbia albida (Del.) A.Chev. (syn. *Acacia albida* Del.), is appreciated in many parts of the Sahel for its ability to provide shade in the hot season, good quality fodder, improve soil fertility through litter fall and nitrogen fixation. It is a perennial, and can therefore be a tool for halting the advancing desert, and is reputed to be edible. *Faidherbia albida* has been cited as a source of edible seeds (Booth and Wickens 1988, Kunkel 1984) which can be boiled and then eaten, and pods have been listed as rich in starch (Kunkel 1984). This species can be found around Tanout, both beside river beds and on plateaux, where the average annual rainfall has been 201mm between 1971-1990 and 177mm between 1981- 1990. (Tanout is located 12km north of Eden's field station).

The chief goal of the research presented in this paper was to find out how best to establish a healthy population of *Faidherbia albida* by direct sowing, without the use of plant nurseries, irrigation or inorganic fertilisers.

Materials and methods.

Seeds for the experiment were gathered by Eden in February 1990 from trees around Tanout. Laboratory tests showed 100% viability.

Seeds were scarified using the following techniques, before sowing in the field:

- a. No treatment (Control).
- b. Nicking with nail clippers.
- c. Cutting with a sharp knife.
- d. Abrasion with a grindstone.
- e. 100 C 12 hours - by pouring boiling water over the seeds and then leaving them to soak in the cooling water for 12 hours. (About ten times volume of water:seeds was used).

The seeds were sown at two different sowing depths, 10mm and 15mm. (See Burford Briscoe 1989, and Doran and Gunn 1986, for further information on seed treatments). Seeds were sown on the 1st and 2nd of August 1990 in the middle of the rainy season, and the seedlings were measured six weeks after sowing.

Seeds were sown in plots of 9 holes each, with 10 seeds per hole. 4 replicated plots of each treatment combination (scarification + sowing depth) were sown. A total of 360 seeds were sown for each treatment combination. The plots were arranged in a completely randomised design among plots of other perennial species undergoing similar tests. Competing plants were removed from around the seedlings at least twice during the rainy season.

The soil in the experimental area was a mixture of two main types, namely a fine red sandy soil with an overlay of coarse pale yellow sand of varying depths.

Results and discussion.

The results are presented in Tables 1A and 1B. They show very significant differences between treatments. Generally, the physical scarification techniques provided the best results compared with 'No treatment' and the hot water treatment. The differences between seed treatments were significant at the 1% level. 15mm sowing depth gave a significantly better result at the 5% level than 10mm sowing depth. One reason for this was that mice and ants mostly tended to disturb and/or eat seeds sown at the more shallow depths.

It was interesting to note that the total rainfall was 172mm for 1990 at the field station, 92mm fell before sowing and 80mm fell after sowing. The rain fell in a few erratically spaced showers after sowing with only 4mm falling during a drought period of one month, a week after sowing. It was therefore quite remarkable that many seedlings survived this drought period, (the seedlings were counted after the September rains). Almost all the seedlings which remained after thinning down to one seedling per hole, which was done after counting in September, still had green leaves at the end of December 1990. According to the experiences of the 1989 season, seedlings which survived until the end of the year remained alive until the following rainy season. (About 200mm rain fell in Tanout in 1989). So we expect many of the *Faidherbia albida* seedlings to survive until the following rainy season.

References.

- Booth F.E.M. and G.E. Wickens (1988) Non-timber uses of selected arid zone trees and shrubs in Africa. FAO Conservation Guide 19. Pub. FAO, Rome, Italy, pp.176.
- Burford Briscoe C. (1989) Field Trials Manual for Multipurpose Tree Species. Manual No.3. Pub. Winrock International Institute for Agricultural Development, Arlington U.S.A., pp.163.
- Doran J.C. and B.V. Gunn (1986) Treatments to Promote Seed Germination in Australian Acacias, pp. 57-63, in Australian Acacias in Developing Countries. Proc. of an International Workshop, Forestry Training Centre, Gympie, , Australia, 4-7 August 1986. Queensland Proceedings No.16, pp. 196.
- Kunkel G. (1984) Plants for Human Consumption, an annotated checklist of the edible phanerogams and ferns. Pub. Koeltz Scientific Books, Koenigstein, Germany, pp. 393.

TABLE 1A: Effect of different treatments on the germination of *Faidherbia albida* when sown at 10mm sowing depth.

TREATMENT	REPLICATIONS				TOTAL NO. SEEDLINGS	% TOTAL SEEDS SOWN
Control	0	0	0	1	1	0.28%
Nicking	2	14	9	18	43	11.24%

Cutting	6	0	0	1	7	1.94%
Abrasion	3	6	8	1	18	5.00%
100 C; 12h	6	0	4	1	5	1.39%

Observed F = 5.19

Required F at 5% = 3.06; at 1% = 4.89

TABLE 1B: Effect of different treatment on the germination of *Faidherbia albida* when sown at 15mm sowing depth.

TREATMENT	REPLICATIONS				TOTAL NO. SEEDLINGS	% TOTAL SEEDS SOWN
Control	1	0	0	4	5	1.39%
Nicking	15	27	21	32	95	26.39%
Cutting	1	3	36	25	65	18.06%
Abrasion	23	23	16	5	67	18.61%
100 C; 12h	0	3	0	1	4	1.11

Observed F = 4.90

Required F at 5% = 3.06; at 1% = 4.89

N.B. Differences between the two sowing depths were significant at the 5% level but not at 1%.

Observed F = 7.27

Required F at 5% = 4.10; at 1% = 7.35.

TABLE 2: Rainfall after sowing date.

DATE	RAINFALL
2nd August	1.0mm
5th August	10.0mm
8th August	47.5mm
18th August	1.0mm
23rd August	3.0mm
10th September	13.2mm
11th September	4.3mm



*This article was originally presented at the workshop on *Faidherbia albida* (*Acacia albida*) entitled "Faidherbia albida in the West African semi-arid tropics", held in Niamey, Niger, between the 22nd and 26th of April 1991. There were 96 participants at the workshop including 55 Africans and 41 Europeans and Americans. 13 Africans came from Niger, 4 from Mali, 1 from Chad and 13 from Nigeria.*

http://www.edenfoundation.org/project/seminars_faidherbia_albida.html